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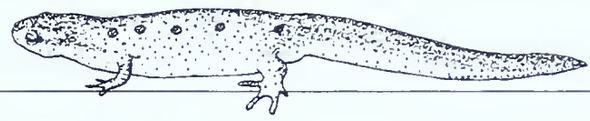
Wildlife-habitat
relationships

PENNSYLVANIA WILDLIFE NO. 1

Wildlife-Habitat Relationships



Both the general habitat type and the specific features of the habitat help to determine the wildlife species found in an area. With a basic understanding of wildlife-habitat relationships, you should be able to predict some of the species of wildlife that might be present on your land and enhance the habitat for specific groups of wildlife.

Habitat

Wild animals require four basic habitat components—food, water, cover, and space. The amount and distribution of these will influence the types of wildlife that can survive in an area. Food sources might include insects, plants, seeds, or even other animals. Water sources may be as small as drops of dew found on grass or as large as a lake or river. Some animals acquire most or all of the water they need through succulent foods like fruits. Other animals, such as wetland dependent species, will not be present on your property unless a wetland habitat, such as a stream or marsh, is available.

Wildlife need cover for many life functions, including nesting, escaping from predators, seeking shelter from the elements on a cold winter day, and resting. An underground burrow, a cavity in a tree, or even plants along a road might provide cover for a den or nest site. A brush pile provides escape cover for rabbits and other small mammals, while evergreens provide nest sites for birds in spring and thermal cover for wildlife in winter. The amount and types of cover available on your property will, in part, determine the species of wildlife found there.

Animals also need space in which to perform necessary activities such as feeding or meeting mates. The space an animal needs is sometimes referred to as its *home range*. As a general rule, large animals have larger home ranges than small animals, and large areas of undeveloped habitat are better for most wildlife.

As the quantity, type, and distribution of habitat components change, so do the types of wildlife species found within the habitat. Wildlife management often involves manipulating components of the habitat to favor a particular species or group of species. Because it is not always possible to alter the amount of space and water in a habitat, most habitat management involves changing the vegetation in an area to provide food and cover for wildlife. Before you attempt to manage habitat for wildlife, you should understand how different types of habitat and features within the habitat determine which species of wildlife will be present. This fact sheet describes some of the most important wildlife-habitat relationships to help you determine which species may be present on your property and how to improve the habitat for certain types of species. Additional fact sheets in this series describe specific management practices.

Successional Stage

Succession is the predictable change in a plant community over time. For example, a field left untouched will become covered with shrubs and eventually with a forest. As the plant community changes, so do

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the habitat components available for wildlife and the wildlife species themselves.

Bare soil, if left alone, will become vegetated over time. Seeds are present in the soil and others arrive by wind, wildlife, and other means. As a result, untended bare soil eventually will become a grassy field, one of the earliest successional stages. Fields provide herbaceous food and cover as well as insects and seeds for small mammals such as meadow voles and cottontail rabbits. Red-tailed hawks and red fox, which feed on small mammals, often hunt in open fields. Birds such as indigo buntings and field sparrows also are attracted to the food and cover found in fields.

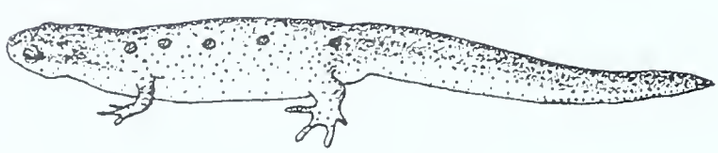
The next stage in plant succession occurs when shrubs and small trees invade an old field. The resulting brushy habitat provides low cover and woody browse, as well as blackberry, sumac, elderberry, and hawthorne berries and seeds. This brush-stage forest is ideal for white-tailed deer, providing the habitat components they need for reproducing, resting, and feeding. Brush-stage forests also provide cover for cottontail rabbits and many other small mammals. Game birds like ruffed grouse and songbirds like catbirds and towhees also find food and cover in brushy habitat.

Although these early successional stage habitats provide a variety of important habitat components, they typically do not include some critical elements. Large seeds, such as acorns and hickory nuts, produced by overstory trees and used as food by many species of wildlife, are generally absent. Cavity trees, which provide cover for birds and small animals, are also not present. Young habitats simply have not had time to develop some of the features present in more mature forest areas.

An unmanaged brush-stage forest will become a pole-stage forest in 15 to 20 years. This type of forest contains trees 4 to 10 inches in diameter at breast height (dbh). Pole-stage forests are generally

As fields grow into forests, the wildlife species found there also change.

Cottontail rabbits



Red-spotted newt

considered the least productive forest habitats for wildlife. They are a transitional stage between brush-stage and mature forests, and generally lack the thick understory cover and browse so abundant in the brush-stage forest. They also lack the large overstory and cavity trees associated with mature forests. In most cases, wildlife will benefit if a pole-stage forest is managed to reverse succession (benefiting species associated with the brush stage) or allowed to mature (benefiting species associated with mature forestland).

As a pole-stage forest matures, cavity trees become more abundant; overstory trees produce more nuts, acorns, and fruit; and dead wood and leaf litter collect on the ground. Woodpeckers, black-capped chickadees, squirrels, and other small animals nest in cavity trees, and gray squirrels and wild turkey eat the acorns and hickory nuts produced by mature trees. Species as large as the black bear and as small as the masked shrew forage for insects in dead wood on the ground, and amphibians such as the red-spotted newt and the northern red salamander thrive in the moist environment created by the closed canopy overhead and the deep leaf litter underfoot. The successional stage of a particular tract of forest often determines the type of wildlife community found there.

Vertical Structure

In addition to the successional stage, the vertical structure of a forest also affects the presence of certain species of wildlife. Vertical structure describes the layers of vegetation present within a forest, from the shortest plants on the forest floor to the tallest trees. Many Pennsylvania forests are even-aged, which means that all of their trees were harvested within a relatively short period of time. In even-aged forests, one often finds only two layers of vegetation: the overstory trees and the forest floor vegetation. Other intervening layers, which often contain

White-tailed deer are most abundant in brush-stage forests.

The gray squirrel and pileated woodpecker are most abundant in mature forests.

shrubs, vines, seedlings, and saplings, are absent, especially in forests in which the understory vegetation has been severely browsed by deer. A forest with a well-developed understory, including trees and shrubs of different heights and ages, is said to have a more complex vertical structure.

Vertical structure is particularly important in determining which bird species might be present. Birds choose habitat vertically as well as horizontally, and individual species are associated with specific layers of vegetation. For example, wood thrushes generally nest from 5 to 15 feet above the ground and are rare if vegetation is not present in this layer. Many species require multiple layers of vegetation. Worm-eating warblers, for example, nest on the ground but forage for insects in foliage, on bark, and on the forest floor. A multiple-layered forest provides essential nesting and foraging sites for many types of birds.

By providing cover and travel routes, a forest with a well-developed vertical structure also benefits other types of forest wildlife, such as small mammals. Gray squirrels and white-footed mice, for example, use the many branches present in a well-developed understory for traveling and escaping from predators.

Size of Area

In addition to the successional stage and vertical structure of the habitat, the size of the area influences which species will be found there. Many species are area sensitive, which means that they are absent from or rare in small patches of habitat and more abundant within extensive areas of undeveloped land. Some have large home ranges, whereas others must travel a considerable distance to meet mates. The northern goshawk, for example, does not inhabit small woodlots because it has a large home range and requires large forested areas free from human disturbance. Many songbirds are also area sensitive. Although they do not have large home ranges, they rarely nest successfully in small patches of forest, where nest predation and

The vertical structure of the forest is important in determining which bird species are present.

Wood thrush

parasitism occur more frequently than in large unfragmented forests. These species, including ovenbirds, scarlet tanagers, and many warblers, are often called forest interior species because they need the insulating effect provided by the forest interior. Many forest-dwelling amphibians also require large tracts of mature forest in which to survive and reproduce successfully.

In Pennsylvania, large expanses of continuous forest are often found on ridge tops. These forests provide critical areas of habitat for species that cannot survive in small woodlots, such as the threatened Allegheny woodrat and many of the area-sensitive species described above. Species such as black-capped chickadees, gray squirrels, northern cardinals, and white-footed mice, which can live in smaller forested areas, usually are more familiar to us, since they often live near residential areas or agricultural fields.

Northern goshawk

Arrangement and Interspersion of Habitat Types

The arrangement of habitat patches also influences the presence of certain types of wildlife. Some species require large tracts of similar habitats (low interspersion), whereas others use a variety of habitats at different stages in their life cycle and require multiple habitat types in close proximity to one another (high interspersion). The scarlet tanager, for example, feeds and reproduces in continuous tracts of mature forest habitat (low interspersion). Conversely, ruffed grouse use a variety of different habitats, including herbaceous open areas for feeding their young, brushy habitat for cover, pole stage forests for drumming, mature forested areas for nesting, and evergreen habitat for winter cover (high interspersion).

The arrangement of habitat patches affects the types of wildlife found there.

Surrounding Landscape

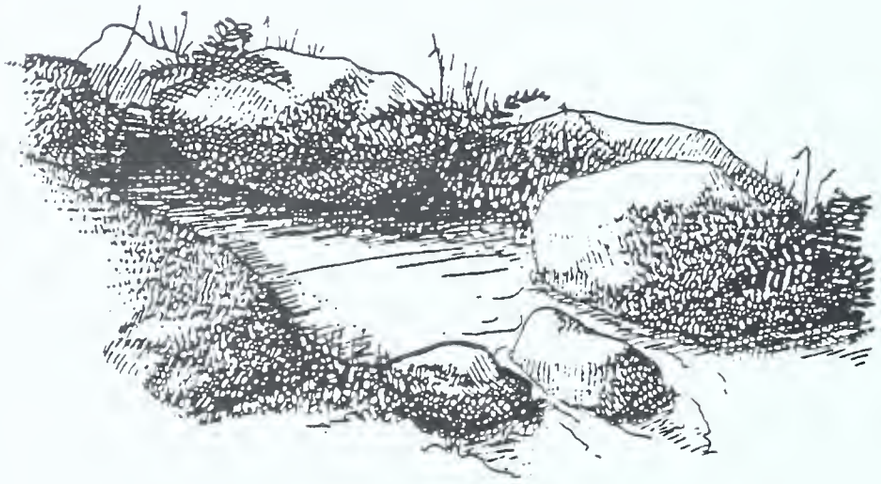
Sometimes a habitat may seem suitable for a species, but that species is not abundant there or even is entirely absent from the area. This may be due to the type of habitat in the surrounding landscape. For example, a wetland, stream, or pond surrounded by a mowed and manicured lawn probably will not support the wildlife that it could if it were surrounded by a buffer of grasses, forbs, shrubs, and trees. The surrounding landscape may also influence habitats on a larger scale. Small woodlots within an agricultural landscape will support a community of wildlife different from that found in woodlots surrounded by commercial or industrial areas.

Because of land ownership issues, it may be impossible to control or manage the landscape surrounding a habitat patch. Awareness of how the surrounding landscape may affect wildlife species that use the habitat, however, will help you to make realistic management decisions for your land.

Dead and downed wood are important components of wildlife habitat.

Time of Year

Time of year also determines when a species is found in a particular habitat. Some species are year-round Pennsylvania residents but shift between habitat types depending on their needs and the availability of food and cover. Deer, for example, may graze in farmers' fields during the growing season but move farther into the woods to feed on acorns in autumn. Other species are migrants and live in Pennsylvania during only part of the year. For example, over 70 percent of the birds in Pennsylvania forests are migrants, present during the breeding season but absent in winter. Although this breeding habitat may not be used by migratory species year-round, it is extremely important during the time that it is used.



Spring seeps provide an important source of water for wildlife.

Special Habitat Features

In addition to general wildlife-habitat relationships, some species also require special habitat features and will be absent if these features are not present. These features include snags, cavities, dead and downed wood, rock outcrops, caves, evergreens, temporary pools, and spring seeps.

Snags and Cavity Trees
Snags are dead or partially dead standing trees. They provide a number of important benefits to wildlife. As a tree dies, its bark begins to loosen and form bark cavities, which are used as roost sites by forest-dwelling bats and as nest sites by brown creepers. Insects, a valuable high-protein food source for certain species, are abundant in snags. A wide variety of birds, including raptors, kingfishers, flycatchers, and many songbirds, also use snags as hunting and singing perches.

Cavities are holes excavated in snags by woodpeckers. They are used for shelter and nesting cover by many species. Over 35 species of birds and 20 species of mammals in Pennsylvania require cavities for nesting, and reptiles and amphibians also use cavities for shelter.

Dead and Downed Wood
Dead wood, including fallen branches and trees lying on the ground, also is an important component of wildlife habitat. As wood decays, it slowly returns nutrients to the ground and supports colonies of insects on which many animals feed. Amphibians rely on downed trees for cover, especially during droughts, when the undersides of fallen logs become a critical source of moisture. Small mammals also use logs on the ground as runways, and reptiles that prey on small mammals and insects use them as hunting areas. In addition, grouse use large logs for drumming sites.

To provide dead, downed wood for wildlife, resist the urge to clean up your property. Strike a compromise by tidying up some of the dead branches into a brush pile, but leave the rest where they land. You can also add dead wood to your habitats during tree cutting by leaving some felled trees on the forest floor and building brush piles with others.

Rocky Outcrops and Caves
Rocky outcrops and caves are generally less common than some other habitat features. Certain species, however, such as the green salamander, require the unique habitat provided by rocky outcrops. Timber rattlesnakes use small cavelike openings in outcrops as hibernacula during the winter, and many other species of snakes use outcrops as escape cover and sunning sites. The Allegheny woodrat uses caves and rock outcrops for nest sites, food storage, and traveling, and the bobcat, a nocturnal animal, uses caves and outcrops for den sites and cover. Caves are especially important in the winter for hibernating bats, and some bats inhabit caves throughout the year. To protect these uncommon species, minimize disturbances around caves and rocky outcrops.

Evergreens
Evergreens, trees and shrubs that retain their leaves or needles through the fall and winter, provide thermal cover for wildlife during cold months. Evergreens with branches that extend down to the bottom of the trunk provide the best thermal cover because these branches keep wind and snow out. Evergreens also provide nest sites and food.

Temporary Pools
Temporary, or vernal, pools are unique wetland habitats that fill with water during a rainy season and then dry up later in the year. Although temporary, they provide a critical breeding ground for amphibians. Because temporary pools do not support fish populations, amphibian eggs can develop there without high losses to fish predation.

In addition to providing breeding and hibernating habitat for amphibians, temporary pools also support a complex web of interactions among a variety of organisms, including aquatic insects, salamanders, frogs, turtles, snakes, small and large mammals, waterfowl, and songbirds.

Spring Seeps
Spring seeps are small streams or ponds fed by fresh water from beneath the surface of the ground. Spring seeps are different from temporary pools because the water source persists year-round. This constant water supply provides important benefits to wildlife.

Spring seeps are particularly important during the winter when they may be an animal's only source of fresh water and food. Wildlife use spring seeps heavily during severe winters, when other sources of water are frozen for extended periods of time. Spring seeps can be critical during periods of deep snow, when the area around a seep remains unfrozen and provides a snow-free travel lane. In early spring, vegetation grows first around seeps, providing a food source at a time of year when most others have been depleted.

This fact sheet presents a brief summary of wildlife-habitat relationships. See other fact sheets in the series for information on individual wildlife species and specific management practices.

Prepared by Colleen A. DeLong, wildlife extension associate, and Margaret C. Brittingham, associate professor of wildlife resources.

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Illustration Credits
- *Rae Chambers:* cottontail rabbits, red-spotted newt, spring seep
- *Jeffery Mathison:* fields growing into forests, vertical structure, habitat patches, dead and downed wood
- *Ned Smith:* white-tailed deer, gray squirrel and pileated woodpecker, wood thrush, northern goshawk

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